Harold Ruiz (PhD, FHEA, MPhys, MSc, BSc)

Associate Professor of Electrical Machines and Power Systems,
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Experience

University of Leicester, School of Engineering, Leicester, United Kingdom

Since 2023/01 **Head of the Green Energy and Transport Research Group (GrEaT).**
Serving as Line manager of 7 Lecturers plus own PhD Students and PostDoctoral RAs.

Since 2022/01 **Associate Professor of Electrical Machines and Power Systems**
Leading the UoL Energy theme at the School of Engineering and Space Park Centre, and in the consortium East Midlands Energy Research Accelerator (ERA-I) and ERA-II.
Programme director of the MSc on Advanced Electrical and Electronics Devices.
Sustaining a student intake with approximately £1.3M per year.

2018/10 – 21/12 **Programme director of the UG and PGT degrees on Electrical and Electronics Eng.**
Development of curricula, accreditation processes, and business cases supporting local and international programs.
Ethics Board Member for the Colleges of Science and Engineering, Arts & Humanities, and Law Research Ethics Committees
Providing technical advice and formal reviewing on GDPR, QA, Information Ethics, and other major Ethical procedures and regulations for conducting effective and ethical research.

2015/09 – 18/09 **Lecturer / Senior Lecturer of Electrical Engineering and Mechanics of Materials**

University of Cambridge, Department of Engineering, Cambridge, United Kingdom

2014/01 – 15/09 **Postdoctoral EPSRC Research Associate, Electrical Engineering Division,** Centre for Advanced Photonics and Electronics. *EPSRC Standard Research Grant No. NMZF/064-2014*

Florida State University, Tallahassee, USA

2012/05 – 12/08 **Postdoctoral Stay,** Center for Advanced Power Systems (CAPS), Visiting fellow for 4 months, working under own (PI) research project funded by CSIC-Spain.

University of Zaragoza, Spanish National Research Council (CSIC), Spain

2012/05 – 12/11 **Postdoctoral Stay,** The Materials Science Institute of Aragón (ICMA), Visiting fellow for 6 months, working under own (PI) research project funded by CSIC-Spain.

2010/09 – 12/05 ***Senior Technical Officer***. The Materials Science Institute of Aragón, Advanced Superconductivity Laboratory.

Relevant Leadership and Citizenship Roles

University of Leicester, School of Engineering, Leicester, United Kingdom

2023/01 - - **Head of the Green Energy and Transport Research Group (GrEaT)**
GrEaT is one of the six established research groups at the School of Engineering. Started in 2023, it responds to the EPSRC priority challenge to rapidly accelerate the deployment of green energy technologies that decarbonise our energy supply and increase energy efficiency in buildings, industry, and transport sectors. The group counts with 10 permanent members of staff specialized in these sectors, all under my line management.

2018 - 22 **Director of Electrical, Electronics, Software, and Communications Engineering Undergraduate and Postgraduate Taught Programme.**
Director since 2020 – onwards, Deputy Director between 2018 - 2020
In this role I have ensured and contributed to the satisfactory operation, recruitment (open days), curriculum development, and accreditation processes of the following programs:

- BEng/MEng on Electrical and Electronics Engineering,
- MSc on Advanced Electrical and Electronic Engineering (with Management)

Education

2015/10 – 2017/06 **FHEA-*PGCAPP***, Fellow of the Higher Education Academy with Postgraduate Certificate in Academic and Professional Practice, **The Higher Education Academy, United Kingdom.**

2012/05 – 2015/09 **Postdoctoral Research Positions** at **University of Cambridge –** UK (2014-15)**,** ***Florida State University –*** USA (2012), and **University of Zaragoza –** Spain (2012)

2008/11 – 2012/04 **PhD Cum Laude** (Highest award in Spain) ***and European Doctor Award.*** *Specialized on the Physics, Materials Science, and Electrical Engineering of Applied Superconductivity*, ***University of Zaragoza***, Zaragoza, Spain.

2008/01 – 2008/10 **MSc. Physical Technologies***,* Bank Santander Research Fellowship, 1st Class. ***University of Zaragoza***, Zaragoza, Spain.

2005/06 – 2007/06 **MSc. Physics**, University Research Fellowship, 1st Class. ***National University of Colombia***, Bogotá, Colombia.

2000/02 – 2004/04 **BSc. Physics***,* University Scholarship, 1st Class. ***Universidad Francisco José de Caldas***, Bogotá, Colombia

Grants Activity (~ £ 2.2 M)

The list below includes participation in research grants as Principal Investigator (PI ~£800k), Co-Investigator (CI ~£195k), Partner (~£300k), or named Research Associate (RA ~£935k). Brief commentary for specific aims, milestones, or outcomes are included only for the most recent entries for the sake of brevity.

2020/06 – 2024/03 **(PI) ~£44k, British Council, Going Global Partnerships - Gender Equality Partnerships Grant**, **Project GEP2023-020**.

2020/06 – 2024/03 **(PI) ~£86k, EPSRC-DTP Studentship programme**, **Project 2438289**. A multidisciplinary approach for understanding the electromagnetic coupling between superconducting and ferromagnetic metastructures, and their application into electrical engineering machines.

2020/10 – 2024/10 **(Partner) ~£300k*, COST Action project CA19108. European Cooperation in Science & Technology*****,*** *- High-Temperature Superconductivity for Accelerating the Energy Transition* (Hi-Scale).

2020/01 – 2023/01 **(PI) ~£303k FEC*, EPSRC Project No. EP/S025707/1*****,*** *Superconducting Ferromagnetic Metamaterials Enabling the Development of Resilient High Voltage / High Current Transmission Systems (SuperFem).*

2021/06 – 2021/09 **(PI) ~£16k*, UKRI CoA Fund*****,*** *Further support on the EPSRC Project No. EP/S025707/1*

2017/10 – 2021/04 **(PI) ~£70k FEC*, CSE – PhD Studentship offer,*** 2D and 3D Multiphysics computational models of monofilament superconducting cables for power transmission applications

2019/04 – 2021/01 **(PI) ~£169k FEC*, British Council Newton Fund, Project No. 413871894*****,*** *Boosting solar energy capacity of Indonesia without compromising protected areas: an integrated GIS tailoring solar energy resource and local information (SolarBoost*

2016/06 – 2016/12 **(PI) £12k*, Early-Career Start-up Research Fund*****,*** *College of Science and Engineering, University of Leicester*, Leicester, UK. Set-up of the advance electromagnetic computational at the School of Engineering

2016/03 – 2016/04 **(PI) £2k, *Santander Bank and University of Leicester Mobility Grant***, Short Research Stay at University of Zaragoza, Spain.

2014/01 – 2015/09 **(RA) £240k*, EPSRC Standard Research Grant No. NMZF/064-2014***, Superconducting fault current limiters for the integration and protection of wind farms. University of Cambridge, Cambridge, United Kingdom.

2012/01 – 2013/01 **(CI) €195k*, Spanish MINECO and the European FEDER program, Grant MAT2011-22719.*** Analysis of the behaviour of materials and superconducting coils for electric power applications.

2012/05 – 2012/08 **(PI) €12k, *CSIC Mobility Grant.*** Research stay at the Center for Advanced Power Systems, Florida State University. Tallahassee, Florida-USA. Electromagnetic modelling of advanced superconducting propulsion systems.

2010/09 – 2010/12 **(PI) €12k, *CSIC Mobility Grant.*** Research stay at Technische Universität Darmstadt, Institut für Materialwissenschaft, Germany. Physical understanding of the macroscopical mechanisms governing the electromagnetic properties of high temperature type-II superconducting materials.

2009/01 – 2013/12 **(RA) €245k, *Spanish Ministry of Science and Innovation, Grant MAT2008-05983*** Manufacturing and characterization of superconductors of MgB2 and high temperature superconductors with technological interest.

2008/01 – 2008/12 **(RA) €180k, *Spanish Ministry of Science and Innovation, Grant MTM2006-10531*** Geometrical and variational methods in integrability and control theory.

2008/01 – 2008/12	**(RA) €270k, *Spanish Ministry of Science and Innovation, Grant MAT2005-06279*** Development of superconducting materials for power applications and the analysis of thermal stability process.
2006/10 – 2007/10	**(PI) USD $25k, *Bank of the Republic of Colombia and National University of Colombia, Grant BANREP 2.203/200706 UNAL 20101009395*** Analysis of possible mechanisms in copper oxide superconductors.

PGR Supervision

3 Post-Doctoral RAs	Dr. Muhammad Fareed (2022-2023), Dr. Milan Kapolka (2020-2022), Dr. Ibrahim Bathis (2020-2021)
13 PhD Students	Dr. Muhammad Fareed (2021), Dr. Ali Akay (2021), Dr. Bright Robert (2020), Dr. Waleed Hassan (2018), Dr. Awat Mulla (2019), Dr. Mehdi Baghdadi (2016), Dr. Zhen Huang (2016), Dr. Zhaoyang Zhong (2015) Mr Joseph Akinwumi (2024/01-), Ms Yajing Xiao (2023/09-),Mr Hasan Al-Ssalih (2023/09-), Mr Yusen Guo (2023/03-), Mr Matthew Clegg (2020/09-),
+15 MSc Students	MSc on Advanced Electrical and Electronics Engineering

External Examiner and Reviewer Positions

UKRI-NERC Panel Member	Participated as Panel Member for the assessment of PAN202: OPP342: Accelerating the Green Economy Centres, which is a major £25 million investment by the UKRI in the delivery of Building a Green Future. Panel meeting 30-31 January 2024.
External Examiner / Moderator	Appointed by the Cambridge Access Validating Agency (CAVA) on the 11th January 2024 as External Moderator/Examiner for all Engineering programs at City College Norwich. Four years appointment.
UKRI Grant Examiner	Recognized Grant Examiner by the UKRI - EPSRC since 2019, with broad experience reviewing Standard Grants, New Investigator Awards, Future Leaders Fellowships, and InnovativeUK Supergen grants. Up to date May 2023 I have served as reviewer of 8 EPSRC research grants.
EU Grant Examiner	External examiner/reviewer for the Poland National Science Centre (Narodowe Centrum Nauki), a funding body equivalent to EPSRC, UK. Last project reviewed on 2019/04/18
Advance-HE Examiner	Recognized as External examiner of the UK Higher Education Academy by Advance HE, Professional development course for accreditation as external examiner.
Journal Reviewer	I often act as peer reviewer for Q1 and Q2 journals, with proven recognition by the Web of Science Group (Publons) for more than 10 peer reviews in Journals such as “Scientific Reports”, “Materials”, “Energies”, “Superconductor Science and Technology”, and several IEEE journals in the last 2 years.

Public Engagement, Invited Talks, Editorial positions, and other Relevant info.

2023 - **Editorial Board Member of:**
- **Frontiers in Electronic Materials,** Frontiers Publishing Group 2023-2027
- **American Journal of Electrical Power and Energy Systems**, Science Publishing Group 2023-2025.

2020 - **Guess Editor:**
- **Materials,** Special Issue: Advances on Ferroics and Superconducting Materials. MDPI 2023
- **Superconductor Science and Technology,** Focus on Numerical Modelling of High Temperature Superconductors, IOP 2022**.**
- **Sustainability,** Special Issue: Engineering Materials for Sustainable Energy Systems. MDPI 2020

2015 - **Invited and keynote speaker.** I have been invited to about 8 international conference events in the last 7 years including, the 6th Annual World Congress of Smart Materials at Barcelona (2022), the 2019 Int. Conf. on Innovative Applied Energy (IAPE’19) at St Cross College Oxford, the 2018 Int. Conf. on Sustainable Energy and Environment Sensing (SEES 2018) at the University of Cambridge – UK, and the 2016 Int. Conf. on Applied Electrical, Electronics, and Informatics Engineering at Pontianak – Indonesia, etc.

2005 - **Research Conferences’ attendance.** Attended to more than 30 academic and professional conferences within the electrical engineering, applied physics, and condensed matter physics sectors, positioning me as a leading and world-known expert in the field of applied superconductivity.

Publications

2023 - **IEEE Transactions on Applied Superconductivity 33(5), 5901206.** M. Clegg & **H. S. Ruiz**. Practical Forecasting of AC Losses in Multi-Layer 2G-HTS Cold Dielectric Conductors DOI: 10.1109/TASC.2023.3257275

2023 - **Superconductivity 5, 100039.** M. Clegg & **H. S. Ruiz**. Electromagnetic analysis and AC losses of triaxial cables with multiple 2G-HTS layers per phase DOI: 10.1016/j.supcon.2023.100039

2022 - **Materials 15(24), 8969.** J. S. Millán, J. Millán, L. A. Pérez & **H. S. Ruiz**. Critical Current Density in d-Wave Hubbard Superconductors. DOI: 10.3390/ma15248969

2022 **Scientific Reports 12, 7030.** M. Kapolka & **H. S. Ruiz**. Maximum Reduction of Energy Losses in Multicore MgB2 Wires by Metastructured Soft-Ferromagnetic Coatings. DOI: 10.1038/s41598-022-10728-5

2022 - **IEEE Transactions on Applied Superconductivity 32(4), 6200305.** M. Kapolka, M. Clegg & **H. S. Ruiz**. Optimum filament positions within a MgB2 wire resulting in maximum reduction of AC losses. DOI: 10.1109/TASC.2022.3160145

2022 - **IEEE Transactions on Applied Superconductivity 32(4), 8200205.** M. U. Fareed, M. Kapolka, B. C. Robert, M. Clegg & **H. S. Ruiz**. 3D FEM Modelling of CORC Commercial Cables with Bean's like magnetization currents and its AC-Losses Behaviour. DOI 10.1109/tasc.2022.3145309

2022 - **IOP Conference Series: Materials Science and Engineering 1241, 012031.** M. Clegg, M. U. Fareed, M. Kapolka & **H. S. Ruiz**. Computational Modelling of Russia's First 2G-HTS Triaxial Cable. DOI 10.1088/1757-899X/1241/1/012031

2021 - **Materials 2021, 14(20) 6204.** M. U. Fareed & **H. S. Ruiz**. Critical State Theory For The Magnetic Coupling Between Soft Ferromagnetic Materials And Type-II Superconductors DOI: 10.3390/ma14206204

2019 - **Materials 12(17), 2679.** B.C. Robert, M. Fareed, and **H.S. Ruiz**. How to Choose the Superconducting Material Law for the Modelling of 2G-HTS coils. DOI: 10.3390/ma12172679

2019 - **Journal of Applied Physics 126, 123902.** B.C. Robert, M. Fareed, and **H.S. Ruiz**. Local Electromagnetic Properties and Hysteresis Losses in Uniformly and Non-Uniformly wound Superconducting Racetrack Coils. DOI: 10.1063/1.5100223

2019 - **IEEE Transactions on Applied Superconductivity 29, 5900705.** M. Fareed, B. Robert, **H.S. Ruiz**. Electric field and energy losses in rounded superconducting / ferromagnetic heterostructures in self-field conditions. DOI: 10.1109/TASC.2019.2893896

2018 **Scientific Reports 8, 1342.** M. Baghdadi, **H. S. Ruiz**, and T. A. Coombs. Nature of the low magnetization decay on stacks of second-generation superconducting tapes under crossed and rotating magnetic field experiments. DOI: 10.1038/s41598-018-19681-8

2018 - **Superconductor Science and Technology 31, 035006.** B. C. Robert and **H. S. Ruiz.** Magnetic characteristics and AC losses of DC Type-II Superconductors under oscillating magnetic fields. DOI: 10.1088/1361-6668/aaa823

2018 - **IEEE Transactions on Applied Superconductivity 28(4), 8200805.** B. C. Robert and **H. S. Ruiz.** Magnetization profiles of AC type-II superconducting wires exposed to DC magnetic fields. DOI: 10.1109/TASC.2018.2794138

2017 - **Superconductor Science and Technology 30, 025010.** X. Zhang, Z. Zhong, **H. S. Ruiz**, J. Geng, and T. A. Coombs, General approach for the determination of the magneto-angular dependence of the critical current of YBCO coated conductors. DOI: 10.1088/1361-6668/30/2/025010

2012 **Applied Physics Letters 100, 112602. H. S. Ruiz**, A. Badía-Majós, Y. A. Genenko, H. Rauh, and S. V. Yampolskii. Superconducting Wire Under Simultaneous Oscillating Sources: Magnetic Response, Dissipation of Energy and Low Pass Filtering. DOI: 10.1063/1.3693614

2012 - **Current Applied Physics 12, 550. H. S. Ruiz** and A. Badía-Majós. Strength of the Phonon-Coupling Mode in La2-xSrxCuO4, Bi2Sr2CaCu2O8+x and YBa2Cu3O6+x Composites Along the Nodal Direction. DOI: 10.1016/j.cap.2011.08.019

2011 **Physical Review B 83, 014506. H. S. Ruiz**, C. Lopez, and A. Badía-Majós. Inversion Mechanism for the Transport Current in Type-II Superconductors. DOI: 10.1103/PhysRevB.83.014506

2009 **Physical Review B 80, 144509.** A. Badía-Majós, C. Lopez, and **H. S. Ruiz.** General Critical States in Type-II Superconductors. DOI: 10.1103/PhysRevB.80.144509

2009 - **Physical Review B 79, 054528**. **H. S. Ruiz** and A. Badía-Majós. Nature of the Nodal kink in Angle-Resolved Photoemission Spectra of Cuprate Superconductors. DOI: 10.1103/PhysRevB.79.054528